

## REBUTTAL TESTIMONY OF CHRIS KAEMPFER, P.E.

Village of Greendale  
Docket No. 3720-WR-107

1 **Q. State your name, capacity in which you are testifying and qualifications.**

2 A. Chris Kaempfer. I am President and Chief Engineer at Kaempfer & Associates, Inc.  
3 Consulting Engineers. I graduated from Michigan Technology University in 1971 with a  
4 Bachelor of Science degree in Civil Engineering. I graduated from the University of Missouri -  
5 Rolla in 1972 with a Master of Science degree in Civil and Sanitary Engineering. Since then I  
6 have been employed as a civil engineer with Brown and Caldwell, Consulting Engineers  
7 (California); Robert E. Lee Consulting Engineers (Green Bay, WI) and in January, 1987 I started  
8 Kaempfer & Associates, Inc. I am a licensed Professional Engineer in the State of Wisconsin.

9 **Q. What is your relationship to the Greendale Water Utility and what work have you done**  
10 **relative to this application?**

11 A. I serve as a consulting engineer for the Greendale Water Utility. I am currently  
12 completing a study for the Utility titled "Village of Greendale Water Supply Study" and I am  
13 assisting the Greendale Water Utility to prepare for the Milwaukee Water Works (MWW)  
14 changing the supply connections from the MWW Riverside Pressure District to the MWW  
15 Southwest Pressure District.

16 **Q. What is the purpose of your testimony?**

17 A. The purpose of my testimony is to provide information to allow the Fire Protection  
18 Charge in Exhibit 12.2 the "Cost of Service Study and Rate Design Proposal" and Exhibit 12.4  
19 the "Alternative Rate Design Proposal" to be eliminated for the Village of Greendale.

20 **Q. Why should the Fire Protection Charge be eliminated for the Village of Greendale?**

21 A. The MWW will only provide capacity in its water system to supply the maximum daily  
22 demand of the Village of Greendale. The Greendale Water Utility provides capacity in its water  
23 system to supply the peak hour demand and fire flows.

**Q. What water supply facilities does the Greendale Water Utility have?**

A. The Greendale Water Utility has a 1.0 million gallon ground storage reservoir, a 1.5 million gallon ground storage reservoir, a booster pump station, a 400,000 gallon elevated storage tank, and two flow control stations. The booster pump station has a design capacity of 10.25 mgd (7,175 gpm) with the largest pump out of service. The flow control stations each have a design capacity of 2.0 mgd (1,400 gpm).

**Q. What options does the MWW have to serve the Greendale Water Utility?**

A. The MWW can serve the Greendale Water Utility from their Riverside Pressure District or from their Southwest Pressure District. The Greendale Water Utility is presently receiving service from both districts.

The Riverside Pressure District is supplied directly from booster pumps at the MWW Howard Avenue Water Treatment Plant. The hydraulic grade line of the Riverside Pressure District is 60 to 80 feet lower than the hydraulic grade line of the Greendale Water System so Greendale must pump the water into their water distribution system.

The Southwest Pressure District is supplied from the Riverside Pressure District by the MWW Grange Avenue Booster Pump Station. The hydraulic grade line of the Southwest Pressure District is 40 to 60 feet higher than the hydraulic grade line of the Greendale Water System so Greendale must reduce the pressure of the water before it enters their water system.

**Q. How is the Greendale Water System supplied from the MWW system?**

A. The Greendale Water System is supplied by the MWW system from a primary connection and two secondary connections. The primary connection is located at the intersection of South 60th Street and West Edgerton Avenue. The secondary connection points are located at the intersection of South 43rd Street and West College Avenue and at the intersection of South 68th Street and West Edgerton Avenue.

The primary connection supplies a 20-inch diameter Greendale feeder main from a MWW 54-inch diameter transmission main. The primary connection for the Greendale Water System is supplied from the MWW Riverside Pressure District. The primary connection has been

51 supplied from the MWW Riverside Pressure District since 1968. The MWW is revising the  
52 arrangement of the piping at the primary connection so the Greendale Water System will be  
53 supplied from the Southwest Pressure District sometime in the next year. The 20-inch diameter  
54 Greendale feeder main has a capacity of 5.65 mgd (3,920 gpm) at a velocity of 4 fps. The  
55 20-inch diameter Greendale feeder main supplies the two Greendale Ground Storage Reservoirs.  
56 The two ground storage reservoirs supply the booster pump station, which supplies the Greendale  
57 Water Distribution System.

58 The secondary connection at South 43rd Street and West College Avenue supplies a  
59 12-inch diameter Greendale feeder main from a MWW 12-inch diameter feeder main. The  
60 secondary connection is supplied from the MWW Southwest Pressure District. The 12-inch  
61 diameter Greendale feeder main has a capacity of 2.0 mgd (1,400 gpm) at a velocity of 4 fps. The  
62 12-inch diameter Greendale feeder main supplies the Greendale College Avenue Flow Control  
63 Station. The flow control station supplies the Greendale Water Distribution System by regulating  
64 the flow rate and reducing the pressure of the water supplied by the MWW.

65 The secondary connection at South 68th Street and West Edgerton Avenue supplies a  
66 12-inch diameter Greendale feeder main from a MWW 16-inch diameter feeder main. The  
67 secondary connection is supplied from the MWW Southwest Pressure District. The 12-inch  
68 diameter Greendale feeder main has a capacity of 2.0 mgd (1,400 gpd) at a velocity of 4 fps. The  
69 12-inch diameter Greendale feeder main supplies the Greendale Edgerton Avenue Flow Control  
70 Station. The flow control station supplies the Greendale Water Distribution System by regulating  
71 the flow rate and reducing the pressure of the water supplied by the MWW.

72 **Q. How will changing the primary connection from the Riverside Pressure District to the**  
73 **Southwest Pressure District affect the MWW and Greendale Water Systems?**

74 **A.** Changing the primary connection from the Riverside Pressure District to the Southwest  
75 Pressure District will increase the pressure in the 20-inch diameter Greendale feeder main  
76 supplying the Greendale Ground Storage Reservoirs. The Greendale Ground Storage Reservoirs  
77 are at or slightly below the hydraulic grade line of the MWW Riverside Pressure District. The

hydraulic grade line in the 20-inch diameter Greenfield feeder main supplying the Greendale Ground Storage Reservoir will be increased 60 to 80 feet after the primary connection is changed to the Southwest Pressure District. The pressure will need to be reduced to supply the Greendale Ground Storage Reservoirs and then the water will be pumped from the ground storage reservoirs by the Greendale Booster Pump Station. The ground storage reservoirs and booster pump station must remain in service so that they can be used to meet peak hourly demands and provide fire flows.

**Q. How is the flow rate from the MWW limited to the maximum daily demand?**

A. The flow rate from the MWW is presently regulated by three flow control valves that automatically limit the flow rate to a predetermined value. There is a 14-inch control valve that limits the flow rate to the two Greendale Ground Storage Reservoirs and there are two 10-inch flow control valves that will limit the flow rate from the MWW Southwest Pressure District to the Greendale Water Distribution System.

**Q. How will the Greendale Water Supply Facilities be designed to operate?**

A. The flow control valves at the three connection points will be set to limit the flow rate entering the Greendale Water System to the maximum daily demand flow rate. The maximum daily demand flow rate that will be supplied by the MWW is 5.25 mgd (3,650 gpm). Under normal operation it is anticipated that the flow control valve for the primary connection will be set to limit the flow to 3.25 mgd (2,275 gpm) and the flow control valves for each of the flow control stations will be set to limit the flow to 1.00 mgd (700 gpm).

The flow control valve for the primary connection will be opened and closed in response to the water level in the ground storage reservoirs. The booster pumps will be started and stopped and the flow control valves for the secondary connections will be opened and closed in response to the water level in the elevated storage tanks.

When demands in the Greendale Water System are equal to or less than the maximum day demand rate only the operating portion of the Greendale storage facilities are used. When the demands in the Greendale Water System exceed the maximum daily demand, the equalizing

storage portion of the storage facilities is used to meet the peak hourly demand or the emergency portion of the storage facilities is used to meet fire flows, water main breaks, and other emergency conditions.

The Greendale Water System has a total of 2.9 million gallons of storage. Approximately 150,000 gallons is operating storage, 1,050,000 gallons is equalizing storage and 1,700,000 is emergency reserve. The emergency storage can support a fire flow of 7,000 gpm for a four (4) hour period. The ISO identified 3,500 gpm as the maximum recommended fire flow required in the Village in their report prepared in 1995. The available fire flow in the Village of Greendale is limited by the water distribution system capacity not the water supply facilities.

**Q. What other items should be considered in evaluating the MWW Fire Protection Charge for Greendale?**

A. Greendale is in a unique position to assist Milwaukee meet emergency conditions and fire flow requirements in the MWW Southwest Pressure District. The Greendale Water System is designed so that it can be supplied from the MWW Riverside Pressure District or the Southwest Pressure District using only the primary connection. The MWW can remove the Greendale Water System from the Southwest Pressure District and supply the Greendale Water System from the Riverside Pressure District by closing six valves and opening one valve. This allows the MWW to provide an additional 5.25 mgd (3,675 gpm) of capacity for use in an emergency in their Southwest Pressure District. No changes would be required in the Greendale Water Supply System.

**Q. What changes would you recommend be made in the Cost of Service Study?**

A. I would recommend that the \$452,393 allocation to Public Fire Protection and associated components for Greendale be removed from Schedule 11A on Page 2 of 2 of Exhibit 12.2. The costs should be reallocated to customers that are being benefited by Public Fire Protection from the MWW. I would recommend that the \$62,172 Public Fire Protection Charge for Greendale be removed from Schedule 12 on Page 2 of 2 of Exhibit 12.2 and from Schedule 13 on Page 8 of 11.